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Journal of the Society of Arts.

FRIDAY, OCTOBER 17, 1856.

POPULAR SCIENCE AND EDUCATION.

The following letter has been addressed to the members of the Yorkshire Union of Mechanics' Institutions, by Edward Baines, Esq., President.

TO THE FRIENDS OF EDUCATION.

GENTLEMEN,—It is known to many of you that the Society of Arts is co-operating with the Mechanics' Institutes of England to promote the extension of practical science and useful knowledge. Believing that the co-operation of this valuable Metropolitan Society with our popular Provincial Institutes may produce great good to the cause of education, I venture to ask your attention to the facts. And I would solicit the attention not only of the Committees of Mechanics' Institutions, but of all young men above the school age, to the explanation I am about to give. Especially would I ask it at this time, because of a determination just come to by the Society of Arts, and because we are approaching that season of the year which is peculiarly favourable to study.

The "Society of Arts, Manufactures, and Commerce" is an association of the friends of improvement in science and art, which has existed for a hundred years in London, but which has lately assumed great activity. It was a principal means of carrying out, with the important aid of Prince Albert and others, the Great Exhibition of 1851. Since that time it has sought to assist the Mechanics' Institutions of England in their valuable efforts to popularise the study of practical science and art. One of the most important methods adopted for this purpose has been the establishment of a yearly Examination of pupils in such Institutions, and the granting of Certificates to all who have attained respectable proficiency in any branch of useful knowledge. The first of these yearly examinations took place last June in London: the results were highly satisfactory, and, amongst others, five pupils of the Leeds Mechanics' Institution obtained fifteen Certificates for their attainments in Mathematics, Mechanics, Chemistry, Bookkeeping, Geography, English History, and the German language. These Certificates are not only honourable, but they will beyond all doubt be of practical utility to the young men in obtaining profitable employment—some in public offices, and others in various departments of industry. Two of the Leeds students have already obtained employment—one in a public office. But the numbers of students who went up for examination was much less than was to be desired, owing in a great measure to the expense of travelling from distant places to London. In order to remove or materially diminish this inconvenience, the Council of the Society of Arts have resolved to hold separate Examinations next Spring for the *North of England*: and the Chairman, the Rev. Dr. Booth, who attended the last annual meeting of the "Yorkshire Union of Mechanics' Institutes" at Middlesbro', was so much pleased with the evidences of spirit and energy in the Institutes of Yorkshire, that he proposed to hold those Examinations in conjunction with the next annual meeting of our Union. That meeting is to be held, as previously determined, at Huddersfield, in Whitsun week of 1857. Finding that the Committee of the Yorkshire Union approved of the proposal, he submitted it to the Council of the Society of Arts; and this morning I have received the following note, communicating the result:—

"Society of Arts, Manufactures, and Commerce,
"Adelphi, London, October 9, 1856.

"MY DEAR MR. BAINES,—You will be glad to learn that

the Society of Arts will hold their Examinations for the North of England at Huddersfield, next June. The Council came to that determination last evening. They have also voted *One hundred guineas* for prizes.

"I trust this movement will stimulate the young men of the Classes of the Institutes of the Yorkshire Union, and with God's blessing, it may be made a great national success. I shall be glad to receive any suggestions from you, should such occur to you.

"Believe me, my dear Mr. Baines,

"Yours faithfully,

"E. Baines, Esq.

"JAMES BOOTH."

I hasten to make this decision known to the Mechanics' Institutions of Yorkshire; and I may venture to say in their behalf that they will give the Society of Arts a Yorkshire welcome. The examinations will not be confined to them alone, but will be extended to the Institutions of Lancashire and all the North of England. But perhaps we in Yorkshire are specially called upon to endeavour to make the examinations successful; and certainly we shall be anxious not to cut a poor figure in them. Happily at Huddersfield, where the meeting will take place, the Mechanics' Institution has the most numerous, if not the best, classes of any Institution in England. But Leeds, Bradford, Halifax, Wakefield, Sheffield, York, Hull, and all our other towns, and even villages, will have an opportunity of sending candidates to the examinations, and of carrying off as many Certificates as they may deserve. They will also be met by candidates from Manchester, Liverpool, Newcastle, and other important places.

The Prizes are a good feature, and perhaps the Hundred Guineas voted by the Society of Arts may be considerably added to by donations of other Institutions, or of noblemen and gentlemen who approve of the object. It is conceivable that the Prizes might be made very numerous, and of respectable value, if the friends of education should send us their Ten Guineas, Five Guineas, Two Guineas, or One Guinea, to swell the sum. I am sure the Treasurer of our Union (Wm. Beckett Denison, Esq., of Leeds) would most gladly receive donations for this special purpose. I hope it will not be considered presumptuous if, as President of the Union, I offer first my own small donation of Three Guineas. I should propose to place any sum that may be contributed entirely at the disposal of the Council of the Society of Arts, for distribution as prizes at the North of England Examinations; but the Committee of the Yorkshire Union will readily be the medium of conveying any contributions that may be entrusted to it.

Whilst regarding the Prizes as a legitimate and useful stimulus, especially in the first instance, I would point out that the mere possession of a *Certificate* from the Society of Arts would itself be a prize well worth contending for. Comparatively few may win pecuniary prizes; but very many may obtain certificates, which would be honourable and valuable attestations of attainments and character. It is not merely to the first in the race that Certificates will be given, but to *all who run well*. Therefore none need be discouraged who have the spirit and perseverance to apply even moderate faculties to attain proficiency in any of the following subjects:—

Mathematics,	Botany,	Roman History,
Book-keeping,	Agriculture,	Latin,
Mechanics,	Geography,	French,
Chemistry,	English History,	German,
Physiology,	English Literature,	Free-hand Drawing.

It is known that a very great number of gentlemen, beginning with the Archbishop of Canterbury, and including noblemen, judges, ministers of state, ministers of religion, members of parliament, lawyers, bankers, merchants, manufacturers, &c., have signed a declaration, stating that they consider the certificates of the Society of Arts of real value, as attesting not merely intellectual attainments, but good habits and character: and would

consider a person possessing such a certificate as bearing a strong recommendation to trust and employment. No man of sense can question, that he who has been a successful student has one important evidence that he is a man of virtue and of honourable aspirations. Next in value to true religious principle comes the habit of virtuous industry: and though, unhappily, the two are not always combined, wherever I found the latter, I should have more hope of finding the former.

It need scarcely be remarked that, if the effect of the proposed Examinations should be very greatly to increase the number of young men in Yorkshire who join Mechanics' Institutions, and devote the evenings of the coming winter to regular and persevering study in their classes, the benefits would not stop with the prizes and certificates which may be won next Whitsuntide. So far from it, if we could suppose all the money and certificates buried in the sea, there would remain what is infinitely better—the attainments realized, and the habits or characters formed, by the young students. We might then be reminded of the excellent fable of the dying man, who told his sons to dig in his vineyard for a treasure: they dug the vineyard over and over, and found no money; but the next crop of grapes was so large in consequence of the digging, that it was a treasure of great value. And so, though we should not obtain the money, we should certainly find that which was more than money's worth—good character, regular habits, knowledge, industry, and virtue. These are the highest wealth of a man or a nation.

It cannot be doubted that the Committee of the Mechanics' Institutions of this county will regard the intended examinations as a call to them to put their classes immediately into the most efficient state, and to invite all the young men around them to become students. We may possibly find the visit of the Society of Arts, with the establishment of examinations and the granting of certificates in the North of England, a turning-point in the history of Institutions like ours. It may so awaken the attention of our youth to the advantages of knowledge, and so kindle their generous ambition, that our halls and class-rooms may be crowded during the coming winter. Is it not clearly the duty of every Committee to do all in its power to promote such an effect? Will they not forthwith meet and consider of every means by which the effect may be produced? Will they not endeavour to have large classes, good teachers, and the best system of class-instruction? If there are any Institutions without classes, it may be hoped they will at once establish them.

I last year recommended a general canvass of every town and village, to be conducted in the months of October and November, for the purpose of making our Institutions known to the entire population, and attracting the young to partake of their benefits. I appealed to the working-men—such of them as appreciated the advantages of knowledge—to make a personal effort for the elevation of the intellectual and moral condition of their own class, by organising a canvass to bring them into the Mechanics' Institutions; and I appealed to the young men to do the same thing for their young companions. The Yorkshire Union, at its annual meeting, expressed its warm concurrence in these recommendations. I therefore now, with the more confidence, and with an additional reason, invite attention to the subject of an efficient canvass, by a special committee connected with the Committee of the Institution. And I add the great desirableness of having persons attending in each Institution daily to welcome applicants, and to assist them in choosing classes or departments of instruction.

A few words, in conclusion, addressed especially to the young, on the advantages of regular study in evening classes. It would be difficult to praise them too highly. A library is valuable, and lectures are interesting; but the department of an Institution which does far more

good than any other is that of the classes, in which young men obtain systematic instruction. General reading of books, magazines, and newspapers certainly gives information; but unless there is a foundation of systematic knowledge to build upon, it does not become fixed in the mind; and the reader is what Shakespeare calls "a man of shreds and patches." A young man who has acquired a knowledge of mathematics has got the key which admits him into many departments of practical science and art. He has the preliminary qualification for becoming a mechanic, a chemist, an engineer, an architect, a builder, a surveyor, a natural philosopher, an astronomer, or a navigator. And having obtained this preliminary knowledge, the special application of it to various practical and scientific uses is comparatively easy. He can only obtain this master-key by steady application; but that application itself is the means of strengthening and disciplining his mind for all kinds of work. Similar remarks may be made concerning various other branches of knowledge. Every person pursuing a trade or profession dependant on machinery or on chemistry may learn the scientific principles on which it rests by studying in the evening classes of a Mechanics' Institution. He who knows principles has a more perfect knowledge of practice; and, as he pursues his business more intelligently, he is also capable of making improvements which an uninstructed workman could not make.

The importance of having our population acquainted with mechanical and chemical science, and with the art of design, is admitted by all who know the progress which other nations are making in manufacturing skill. Persons who are wholly unconnected with those kinds of industry may study book-keeping, modern languages, geography, and history, and may thus qualify themselves either for mercantile pursuits or public employment. It will be seen that agriculture and botany are also subjects in which the Society of Arts examines students.

If the considerations submitted above are of weight, may we not hope that the friends of popular education in Yorkshire will take advantage of present circumstances to begin anew their public-spirited labours? If we are to reap next summer, we must sow our seed this autumn. Let this month of October not pass before the plan of the winter campaign is laid, and the forces for conducting it organised. Let a bold invasion be made on the dark domain of ignorance. Let the coming winter be the most active and useful season we have ever known. Then will Yorkshire stand honourably in the Examinations next Whitsuntide, and her towns and villages will rejoice in the extension of sound knowledge and good habits among their people.

I am, Gentlemen, your most obedient Servant,

EDWARD BAINES,

President of the Yorkshire Union of Mechanics' Institutes.

Leeds, Oct. 10, 1856.

TO THE CANDIDATES WHO OBTAINED CERTIFICATES IN JUNE, 1856.

Application has been made to the Secretary, by one of the principal philosophical instrument makers in London, to recommend, as an assistant in his establishment, a gentleman possessing a competent knowledge of chemistry, natural philosophy, and the French language, whose age is not less than 25 years, and who has been accustomed to take an active part in a house of business. The remuneration would not be less than £80 per annum. Applications (from certificated candidates only) will be received by the Secretary at the Society's house.

SUBJECTS FOR PREMIUMS.

(Continued from page 745.)

CLASSES XI. TO XXIX.—MANUFACTURES.

TEXTILE FABRICS AND MATERIALS.

166. For the production of a lustrous Wool, to be used in lieu of silk, in the manufacture of fringes, carriage-laces, &c.
167. For the best specimens of Woollen Velvets and Velvetens, of a moderate price, not liable to fade or become rusty, and especially suitable for furniture and the interior of carriages.
168. For an account of an improved method of transferring the pattern from the original design to the Jacquard Loom.
169. For an economical means of producing figured patterns in the Loom by means of Electricity.
170. For a means of producing by the electrotype process a gilded pattern or portion of a pattern on textile fabrics, or of gilding the fibre previous to weaving.
171. For the successful application of some new means (as Electricity or Photography, for instance) for producing Ornamental Coloured Designs in Woven Fabrics, which shall be cheaper and easier of application than those at present employed.
172. For an account of the methods at present practised in France and Russia for dyeing and dressing Morocco Leather.
173. For an efficient means of removing the fatty matters from skins, so as to render them capable of receiving mordants by the ordinary printing process.
174. For a Negative Photographic Paper, uniform in texture, suitable for waxing, and of better quality than any at present in use.
175. For the best series of Tinted Writing and Packing Papers coloured in the pulp, made from materials not suited for the manufacture of white paper.
176. For the best method of Colouring Paper in the pulp with indigo, and with greens of various hues, the colours not to be liable to be affected by gases.
177. For improvements in the manufacture of Transparent Papers.
178. For the best method of Glazing Paper in the web.
179. For a method of more thoroughly Sizing Machine-made Papers with Animal size.
180. For an account of the processes at present used in the re-conversion of Woollen Rags, with specimens illustrative of the manufactures in which they are employed.
181. For an account of the methods and materials used in the manufacture of Waterproof Goods.
182. For an account of the machinery and processes used in cutting, working, and embossing Veneers, in imitation of carved work.

METALLIC, VITREOUS, AND CERAMIC MANUFACTURES.

183. For the best essay on Ancient Goldsmiths' Work.
184. For the best specimen of Ornamental Enamel on Metal.
185. For the best specimen of the Figure, worked either in Repoussé or by Chasing in Silver, out of the solid plate.
186. For an account of any new and improved processes for economically producing reflecting surfaces applicable to Lighthouses, or for general purposes.
187. For the best specimens of Cisterns suitable for household or other purposes, made of Glass in one piece.
188. For a cheap quality of Glass, applicable for drains, water-pipes, sinks, shelves for larders, dairies, &c., in which coarseness and want of transparency are not regarded.
189. For a new kind of thick Glass suitable for fixing in floors to light lower rooms, vaults, &c., which by the arrangement of its two surfaces will give the greatest amount of light.
190. For the best specimens of Glass for Chemical use, capable of resisting a high degree of heat without softening, and not liable to break from changes of temperature.
191. For an account of the processes employed in Chromatic Painting on Glass, Porcelain, Clay, Lava, and materials susceptible of vitrification, or capable of receiving an enamelled surface.
192. For a chemical means of Engraving on Glass and Crystals, avoiding the injurious effects of fluoric acid, and producing finely-detailed designs.
193. For some Chemical or Mechanical process for fixing or engraving the collodion photographic image on its plate of glass, so that it may be employed ornamentally in windows, &c., or as a matrix for obtaining impressions on paper.
194. For a new process for transferring to Porcelain, Photographic images which may be permanently fixed by being burnt in, and enamelled on the surface.
195. For any important improvement in the construction of Kilns for firing or baking Porcelain, China, and Earthenware, by which smoke is consumed or fuel economised.
196. For an essay on the manufacture of Earthenware Pipes and Stone Ware in general, with an account of the improvements introduced in the construction of the Kilns used in burning such wares, by which the emission of black smoke has been prevented.
197. For an account of the various Artificial Stones and Terra-Cottas introduced and employed for purposes of construction, stating their properties, advantages, and imperfections, and their relative cost as manufactured, both inclusive and exclusive of loss by breakage in the kiln.
198. For an essay on the various Concretes, Cements, Hydraulic Mortars, and Lutings for Pipes, Tanks, &c.

MISCELLANEOUS MANUFACTURES.

199. For an essay on Architectural and Decorative Ornaments; the materials employed, their mode of manufacture, and the comparative cost of production.
200. For a Composition for Feeding-Rollers for Printing Paper Hangings by cylinder machinery, similar in consistency and texture to the gelatine rollers used in letter-press printing, but adapted for working in water-colours.
201. For the best form of Kiln for the manufacture of draining tiles, hollow bricks, roof tiles, paving tiles, or common bricks; which Kiln shall be the cheapest and simplest to construct, with the least quantity of materials for transport, shall consume the smallest quantity, and effect the most perfect combustion of fuel, with or without means of drying in the Kiln itself or in a shed attached to it: to be verified by trial works and the cheapest production of perfect goods.
202. For an account of the methods of Distilling Coal or Bituminous Substances, and utilizing the residuum.
203. For the best means of preventing salt efflorescences on walls.
204. For any improvements and extensions of the processes known as "Nature Printing," to be accompanied by specimens.
205. For an Elastic Material for Tubing suited to the conveyance of Gas, and not liable to be affected by alterations in temperature, or to be acted upon by the gas itself.
206. For a ready means of Extracting Grease Stains from the finished surfaces of leather goods of a light colour.

207. For an Essay on the Arterial Drainage of Land, considered with reference to the geological strata of the districts to be drained, with suggestions for such improvements in the main and subordinate outfalls of the country as are rendered desirable by the more rapid accumulation of surface water, caused by the increase of under-draining.
208. For the best method of economically deodorising sewage and other waters, and of precipitating or otherwise extracting the matters held by them in solution or suspension.
209. For the best method of separating (and preserving) Ammonia and its compounds, from sewage waters and refuse matters, for agricultural purposes.
210. For the best method of converting precipitated or extracted Sewage Matter into a dry or available state, for agricultural purposes.
211. For the best method of enriching the solid matters obtained from Sewage Waters, either by mixing the same with other salts, or manures in which the solid sewage matter is deficient, so as to adapt it to various agricultural crops; or, by facilitating its decomposition, to render any latent fertilizing ingredients it may contain, more readily fit for the food of plants.
212. For an essay on the management and maintenance of public roads, with special reference to their altered position, since the introduction of railways.
213. For an account of the rise and progress of any one of the principal Shipping Ports of the United Kingdom, and the influence of railways and steam transport upon its commerce.
214. For the best treatise on the Commercial Products of the Islands of the Eastern Archipelago, and their facilities and openings for trade.
215. For an account of the Linen Trade of the United Kingdom.
216. For an essay on the various branches of Industry which are known to be unhealthy, pointing out the causes of their injurious effects, with suggestions for prevention or relief.

NOTICE.

The Society is willing to receive communications on subjects not included in the foregoing list, but in all cases expressly reserves the power of rewarding any communication according to its merit, or of withholding the Premium altogether.

All communications must be written on foolscap paper, on one side only, with an inch and a quarter margin. They must be accompanied by such drawings, models, or specimens as may be necessary to illustrate the subject. The drawings should be on a sufficiently large scale to be seen from a distance when suspended on the walls of a meeting-room.

In regard to Colonial Produce of all kinds, it is absolutely necessary that a certificate from the Governor, or other qualified person, should accompany the samples sent to the Society, certifying that they really are the produce of the particular district referred to. The samples should be sufficient in quantity to enable experiments to be made, and an opinion to be formed of their quality; and it is desirable that the cost price in the district from which they are forwarded should be given. In every instance the maximum extent

of the plantation from which the produce has been taken should be stated, with the average yield obtained, and whether similar articles have hitherto been exported from the Colony, or not, and in what quantities.

All communications and articles intended for competition must be delivered to the Secretary, at the Society's house, free of expense, on or before the 31st of March. This restriction, as to the date of receipt, does not apply to articles of Colonial produce.

Any communication, or paper read at an ordinary meeting, will be considered as the property of the Society. Should the Council delay its publication beyond twelve months after the date of reading, the Author will be permitted to take a copy of the same, and to publish it in any way he thinks fit.

Unrewarded communications and articles must be applied for at the close of the Session, between the third Wednesday in June and the last Wednesday in July, after which the Society will be no longer responsible for their return.

By order,

P. LE NEVE FOSTER,
Secretary.

BESSEMER IRON.

The following is an account of experiments on this process, made under the superintendence of Messrs. Smith, Phillips, and Co., the owners of the Dafen Tin Plate Works, Llanelly, who, at the request of the Secretary, have forwarded specimens to the Society's house, for the inspection of any persons interested in the subject.

In the first place, the firm furnished Mr. Bessemer with a mixture of different sorts of pig iron, such as are used by them for making their best charcoal bars. This was melted in the presence of one of the firm at Baxter House, and then run into the converting vessel, and in twenty-five minutes an ingot of soft malleable iron, ten inches square, was produced. It was so soft as, when cut with a chisel, to have almost the appearance of lead. The charge of iron being insufficient to fill the mould, a thin crust was formed at the upper end of it, and so strong was it that it required considerable exertion with a heavy sledge hammer before a small piece, about an eighth to a quarter of an inch thick, could be broken off. The ten-inch ingot being too large to be treated properly there, Mr. Bessemer had it hammered down at Woolwich into two ingots of about four and five inches square. It was evidently injured by this process, having been apparently overheated, for the two ingots broke easier than ordinary pig iron of the same size would do. This was very discouraging, but the firm determined to continue the trial. They began by heating part of an ingot in a hollow fire, and when it was at a white heat, it was reduced under a 30-hundredweight steam hammer to a slab, about five inches wide by three inches thick. This was again heated and rolled into a bar, half an inch thick, and a very wretched-looking bar it is stated to have been, being deeply cracked all down one side. Much better bars have, however, since been made from part of the *same* ingot. So bad was it, that one of the firm thought it useless to proceed further with the experiment; but another member, nothing daunted, had it cut up into pieces of the usual length, and taken to the mill. It proved to be what is called in the trade very cold short, and did not cut at all well. Here, how-

ever, the difficulties ended, for it rolled beautifully into sheets, to the amazement of all who were present. The thinnest of the specimens sent (all of which were made from the unpromising looking bar above mentioned) is what is called "tagger" iron, and is unusually thin. At all events, none so thin have ever before been produced there, or at all approaching to it. It will be found, on bending it, that it is remarkably tough. The thicker piece of iron of the specimens sent has not been annealed, and therefore is not so tough; but the same iron, annealed and finished as tin plate, stands what is considered a very severe test, namely, twice doubling without cracking. The firm have reason to believe it is fully equal to plates of the same substance made from their best charcoal iron.

This experiment, and others since made, lead to the belief that, if uniform results can be obtained from the converting vessel, and if the same quality pig iron is always used, there is every reason to believe that the invention will prove very valuable to tin plate makers, as there is clear proof that sheet iron of superior quality may be produced by adopting it.

The best way of working the large ingots into bars has yet to be learnt; but it is expected that the plan Mr. Bessemer recommends, of passing them through a series of rolls, will be found to answer perfectly. It may be mentioned that Messrs. Smith, Phillips, and Co. tried a piece of the bar from which the specimens sent were rolled, in the blacksmith's shop. It proved to be very red short, and difficult to work; so that some further improvement in the process is required before iron made by it can be brought into general use.

NEW PROCESS FOR THE MANUFACTURE OF STEEL.

For the satisfaction of a number of scientific gentlemen, engineers, and others interested in the subject, an exhibition of the new method of manufacturing steel, the discovery of Capt. Uchatius (Engineer in Chief of the Imperial Arsenal at Vienna), was made on Saturday last, at Messrs. Rennie and Sons, the Albion Engine Works, Holland-street, Blackfriars-road, in the presence of numerous spectators.

Mr. Charles Lenz, the partner of Capt. Uchatius, operated on the occasion, assisted by workmen from the factory of Messrs. Turton and Co., at Sheffield. Whilst the process was going on, Mr. Lenz read a paper descriptive of the invention. He commenced by explaining that he had laboured under many disadvantages in being compelled to contrive substitutes for the regular furnaces and other proper appliances peculiar to steel works, but, nevertheless, an opinion could be there formed of the merits of this important invention, for all the melting operations in cast steel manufacture were necessarily a series of operations on a small scale, the size of a steel crucible limiting the magnitude of the furnaces. He proceeded to state that the method adopted in England, and all over the world, he might say, for making the best descriptions of cast steel heretofore, was to convert Swedish or Russian bar iron, by a lengthy, uncertain, and costly process, first into what is called blister steel, which product was then melted down in crucibles and cast into ingots for the manufacture of the bar steel of commerce. The invention about to be exhibited by him would render this country quite independent of Sweden and Russia for steel iron-making, as he would show the company present that East India pig iron, now very plentiful and cheap here, could be converted into fine steel in as few hours as Swedish and Russian bar iron would take weeks to manipulate; in addition to which, he could assure those present that numerous descriptions of ordinary English pig iron would answer for this process equally well, if he might judge from the limited experiments in English iron he had performed. Indeed, the results of these ex-

periments were very remarkable, and he expected that nearly all the ironworks would soon make steel as regularly as they now made iron. He begged the company to consider the importance of a discovery which would so reduce the cost of steel as to render it available for numerous purposes in engineering, now quite precluded by the price; he did not hesitate to assert that fully two-thirds might be saved in the cost of producing cast steel by using the present instead of the old process. Mr. Lenz then proceeded to explain that the invention of Capt. Uchatius was founded upon the well-known fact that cast iron surrounded by any oxygenised materials, and subjected to a cementing heat for a given time, would yield up a portion of its carbon, which would combine with the oxygen driven off from the surrounding materials, forming carbonic oxide or carbonic acid gas. If this process were interrupted before completion, a partially decarbonised iron would result, the surface of which would have been converted into a pure iron, while the inner parts remained unchanged; or, in other words, the progress of the decarbonising action would depend on the amount of metallic surface brought into contact with the oxygen-yielding material with which the iron was surrounded. In order, therefore, to expedite this operation, the pig iron was first reduced to a granulated state, which was accomplished by simply running the molten iron from the cupola (a blast furnace in some cases) into cold water, agitated by mechanical means. This granulated iron was mixed with a proper proportion of pulverised oxygen-yielding materials of a very cheap description, such as sparry iron ore (spathose ore), and adding, if requisite, a small quantity of manganese, which mixture was put into common crucibles and subjected to heat in a cast-steel blast furnace of ordinary construction. By thus subjecting the granules of iron, in presence of the sparry iron ore, to a melting heat, the surrounding oxides would first effect a partial decarbonisation of the granulated iron, which decarbonisation would be limited in amount according to the size of the granules operated upon, and by reason of the continued application of heat the iron would melt and separate (with the assistance of the melting residue of sparry iron ore) from the impurities with which it was mixed, and also bring down with it a portion of the iron contained in the sparry iron ore, thereby increasing the yield of cast-steel by about 6 per cent. The manipulations of melting and casting were the same as those commonly employed by cast-steel manufacturers. The quality of the steel made by this process could be considerably modified. Thus, the finer the pig iron was granulated, the softer would be the steel made therefrom. The softer sorts of welding cast-steel might be obtained by an addition of good wrought iron in small pieces, and the harder qualities by adding charcoal in various proportions to the before-mentioned mixture. Thus, continued Mr. Lenz, might crude iron be converted into steel ingots in the incredibly short space of about two hours.

Mr. Lenz then proceeded to exhibit the preliminary process of granulating, by running a crucible of melted pig iron into a vessel of water, when it was instantaneously converted into shot-like particles. A weight of 24lb. of the granulated iron was mixed with six pounds of crushed ore and peroxide of manganese, in the proportion, it was said, of about 4lbs. of ore and 2lbs. of peroxide of manganese, to which was added a small quantity of fire-clay, and filled into the crucible in the temporary furnace, and allowed to melt in the usual manner. In the mean time the company proceeded to witness the operation of the hammering down into a bar of an ingot of this new steel, which had been made a few days since, and although the steam-hammer used was not at all adapted for steel, nevertheless, the bar steel produced from the ingot then hammered was pronounced to be of excellent quality, and tools made by Messrs. Rennie from a fellow ingot were tried and found to possess the qualities of fine English cast steel. After two hours and

three quarters had elapsed since the filling—some defect in the blast a little retarding the melting—the contents of the crucible were poured into the iron mould, from which, when opened, an ingot of steel, weighing 25lb., being 1lb. more than the iron used, was exhibited to the company, which bore every external evidence of being perfect in quality. It was to be forwarded to the steel works of Messrs. Spencer and Sons, of Newcastle-on-Tyne, to be properly tilted into bar steel for further tests as to its quality and properties. The simplicity and rapidity of the new process, as well as the quality of the specimens of steel shown, elicited much admiration. The importance of the process in reducing the cost of steel can scarcely be overrated when the innumerable new uses to which it would inevitably be turned in preference to iron are considered—the expense of steel tyres, axles, piston rods, shafts, and other important working parts of machinery being estimated as not exceeding the price now paid for first-class iron.

The gentlemen present on Saturday were—Messrs. Appold, C. Atherton, Engineer-in-chief Woolwich Dockyard, Anderson, Engineer-in-chief Woolwich Arsenal; W. B. Adams, Bachhoffner, Brown, of Ebbw Vale Ironworks; Beale, G. E. Cooper, Charles Cammell, D. Kinnear Clarke, Captain Edwards, H.E.I.C.S., Joshua Field, C.E., J. Freeman, Jos. Glynn, F.R.S., C. H. Gregory, C.E., Evan Hopkins, C.E., W. J. Hamilton, Harcott, Kitson, Kreeft, P., Le Neve Foster, Loyd Foster, T. Lloyd, Levick, H. Maudslay, C.E., Charles Manby, C.E., Charles May, C.E., F. Marriott, G. Morton, W. Needham, of Butterley Ironworks; Joseph Robinson, of Ebbw Vale and Coalbrook Dale Ironworks; Rennie, T. Spencer, Simpson, H. Turner, Walker, Weyte, of Woolwich Arsenal, &c.

The thanks of all present are due to Messrs. Rennie and Sons for their courtesy and liberality in thus affording the scientific world of London an opportunity of witnessing so interesting an experiment.

THE LATE JOHN WOOD, ESQ.

On Friday last died John Wood, Esq., Chairman of the Board of Inland Revenue. In him the Society has lost a warm friend, and one of the earliest promoters of the system of Examinations lately established for Students in Classes at Mechanics' Institutions. It will not be forgotten that, on the first promulgation of the Society's plans, he at once placed at the disposal of the Council two appointments in the Inland Revenue service, to be competed for at the annual examinations, and thus helped materially to secure the success which has attended the Society's exertions in this direction.

DEATH OF FRANCIS WHISHAW, ESQ.

The members of the Society will learn with regret the death of Francis Whishaw, Esq., formerly Secretary to this Society. It is to the zeal and energy of Mr. Whishaw that the Society stands indebted in a great measure for its resuscitation. He accepted the office of Secretary at a time when there were few members to support his exertions, and scarcely any funds with which to meet its expenditure. Owing to his continued personal efforts, backed by the advice and assistance of a few active members whom he gathered around him, he succeeded in instilling new life into the then all but expiring body. His labours to improve the character of the Society's evening meetings, the conversazioni he established, and the efforts he made to promote the formation of a National Exhibition of the Industries of Great Britain, brought around him a body of friends and members who, on his retiring from the office in 1845, elected him an Honorary Life Member of the Society. His death took place on the 6th instant, the immediate cause being an attack of apoplexy.

ART TREASURES EXHIBITION.

The brickwork for the façade of the building progresses steadily. The great central arch is nearly completed at the front; the centres are up for the picture galleries; and good deal of work has been completed behind. Already a decided advance has been made with the placing of the rows of pillars which mark the centre and side aisles of the great hall, and in the fixing of the girders upon them. When work is commenced at the opposite end, the daily progress will seem almost marvellous.

Four huge travelling scaffolds have been erected; and a great portion of the immense floor has been (temporarily) covered with deals, for the wheels of the scaffolds to run upon. The groundwork has long been completed. All the ironwork—including pillars, girders, arches, tie-rods, and casing sheets—has been finished at the works of the contractors, Messrs. C. D. Young and Co. at Glasgow and Edinburgh; a large proportion has been deposited upon the ground, and the remainder is on its way here, by rail. All the flooring boards, and the wood for lining the building internally, are upon the ground; and various arrangements are being completed for a vigorous start in fixing the ironwork. The fixing of the pillars and girders will be carried on from each end; the hoisting of the ribs for the arches and the laying of the flooring being carried on, so that all shall progress almost simultaneously, except the placing and rivetting (or bolting) of the external plates. No doubt of the completion of the building by the 1st of January is entertained by those who are responsible for such being done.

Colonial Correspondence.

COLONIAL LABOUR.

SIR,—I observed in your last *Journal* a communication signed "Leonard Rowe Valpy," the writer of which says, that in my letter on Colonial Labour "there are one or two points on which I have fallen into error, and which he thinks require correction." If I have had the misfortune to "fall into error," I am very sorry for it, and I shall be happy to be corrected by Mr. Valpy or any one else. But there is nothing more facile than accusation of error, and it is easier to contradict than to disprove. Now, Mr. Valpy's "correction," as he is pleased to call it, amounts to nothing more than a broad denial of the truth of my statements, and he seems to think that his simple assertion is sufficient to convict me of error. As I am not disposed to recognise in Mr. Valpy an indisputable authority on colonial questions, I should require something more than his mere word. Of course Mr. Valpy, like any other gentleman, would not make any statement which he knew to be at variance with truth. But Mr. Valpy is human, and, therefore, as liable to "fall into error" as the humble individual now addressing you. Mr. Valpy says, that "my local knowledge entitles me to the credit of authority" in matters connected with Honduras, but in Jamaica, "he has resided for several years," and, therefore, on the affairs of that island he claims to be oracular. It has not been my good or evil fortune to reside for many years in that highly favoured colony, but I have at sundry times conversed with gentlemen whose residence had been much longer than Mr. Valpy's, and whose pretensions to intelligence and knowledge were as strong as his. Other sources of information, in the shape of blue books, despatches and returns, have also been as open to me, and to all the world, as to Mr. Valpy.

But what are the errors into which I have fallen, and which call for Mr. Valpy's correcting hand? In endeavouring partly to account for the scarcity of colonial labour I mention, amongst other causes, first the tone of

mind which took possession of the negro immediately after the cessation of slavery, and secondly, the imprudent distribution of small lots of land amongst the African race. I also stated, as a probable prospective cause of the further diminution of the labouring class, the system of education which many most estimable, intelligent, and praiseworthy persons are desirous of introducing into the Colonies. And what does Mr. Valpy say? "It is true that on attaining freedom the negro was unfitted for continued industry." Precisely what I say. "Again it is true that by the sale of waste mountain lands in a few of the islands the negroes were withdrawn from the plantations." I say pretty nearly the same thing, but I respectfully deny that they were *waste* mountain lands. In using the words "a few of the islands" Mr. Valpy of course intends to include Jamaica, for he afterwards says, "I profess not, however, to pass even an opinion as relating to any other colony than Jamaica." Again he writes: "I agree with Mr. Temple as to the degree of education required." These are Mr. Valpy's own words. In reality, then, he does not differ from me as to the broad facts. I say that when slavery ceased to exist, the negro would not at first engage in continuous work. Mr. Valpy says the same. I say that by the sale of land to the negro he was withdrawn from the labour market. Mr. Valpy says the same. I mention a system of education which I think is most fitted for the children of the negro population. Mr. Valpy says he agrees with me.

Mr. Valpy says, "Mr. Temple shall once more correct himself; alluding in another portion of his communication to the habits of the negroes, he says: 'If they have land of their own they *will not* cultivate it to any useful purpose. A few yams, &c., are all that they will grow, and for these little or no labour is required.' Had the feeling above mentioned been the guiding impulse of the small freeholder, there would have been no cause to complain of the result. It is the wasteful system of temporary squatting which causes so much evil to all sections of society." I do not quite comprehend what Mr. Valpy means by "the feeling above mentioned being the guiding impulse." But passing that over, does he mean seriously to state as his opinion that dividing the land into small lots, and granting them to the negro, are productive of results "of which there is no cause to complain?" Temporary squatting is doubtless mischievous in its effects. It promotes an idle and roving disposition, and it injures the land by a careless and unskillful cultivation. But you have the remedy in your own hand. You can put the law in operation, and stop it at once if you think proper. But the permanent and rightful occupation of small lots of land is productive of evils which cannot be remedied. If Mr. Valpy were to turn his tenant Farmer Flamborough out of the land which he cultivates so well, and the rent of which he regularly pays on every quarter day, and divide it into a hundred or more small parcels, and let each of them to a day labourer, the land would not be properly cultivated, and Mr. Valpy would never see a stiver of his rent. Instead of the goodly crop of wheat, and oats, and barley, which the farm now produces, and which the said Mr. Flamborough turns to a very satisfactory account, one lot would be sown with potatoes, another with turnips, in another there would be cabbages, and in another perhaps there would be nothing at all. Scarcely a tenant would get such a return for his produce as would enable him to pay his rent, and keep his wife and family from the parish. Then, again, for want of intelligence and money, the land would be ruined by a vicious cultivation.

Mr. Valpy says, "I agree with Mr. Temple as to the degree of education required; but I cannot think it necessary to join in his remonstrance against the *evil of cramming* [the word is not mine] the negro mind 'with metaphysics and logic, history and astronomy, Latin and Greek, the niceties of grammar, and the subtleties of

style.'" The above sentence is not very easy to understand. If Mr. Valpy agree with me as to the degree of education required, he *must* join with me in my remonstrance, and if "*cramming*" be an "*evil*"—he cannot defend it. But it appears that Mr. Valpy would "*cram*" the negro mind with Latin and Greek, &c. If that be his "*peculiar vanity*" I have nothing more to say. He has a perfect right to indulge in it. Hercules performed twelve labours, for which, and other acts of virtue, he was rewarded by being made a god. Simeon Stylites stood for thirty-seven years on the top of a high column, for which meritorious achievement he was very properly compensated by being admitted a member of the College of Saints. But what adequate reward can be given to that deserving person who shall succeed in "*cramming*" the negro mind with Latin and Greek.

Mr. Valpy says, "His local knowledge entitles him to the credit of authority when he points to the 80,000 Indians in question. If it be true that these people would be glad to escape from their oppressors, I should have thought such a supply amply sufficient for some years to come." So should I. But in a population of 80,000 how many women and children are there, does Mr. Valpy suppose? How many sick and infirm? And how many are there who are inveterately idle, and who cannot be got to work for love or money? Making all necessary deductions from the 80,000, I shall only get about 5,000 able-bodied and industrious labourers.

Mr. Valpy quotes, but whether to support his views or mine it is difficult to say, a letter published in a Jamaica newspaper, and signed with the initials "W. W. A." The writer of the letter is, I presume, Mr. Anderson, a highly respectable attorney of Spanish-town. I do not know that I should be disposed to adopt, without qualification, his opinion respecting colonial affairs, although I entertain for him personally a great respect, for he is a very worthy and intelligent man. But let us hear what he says in the letter quoted by Mr. Valpy:—

"How to procure labour for the profitable working of his large fixed capital, has long been the all-absorbing question of the proprietor, and no progress has yet been made towards the solution of it. Meanwhile ruin is creeping like a leprosy over our future. Several elements enter into the labour question which have not yet had that attention which is essential to the attainment of just practical conclusions upon it. The condition out of which we have emerged had laws of its own, and gave form and body to a condition of the society which prohibited the advancement of the labouring classes, although these formed the numerical majority. The course of the old economy was to concentrate on single plantations bodies of labourers as large as the landholder's purse could procure, and according to the extent to which he was enabled effectually to cultivate the lands immediately surrounding his building and machinery, so were his profits. In a state of freedom, these considerations must in a great measure be reversed. When the quondam slaves have thoroughly understood their new position, all considerations affecting the capitalist will be lost in the consideration of what is personal to themselves. He is no longer the lord of *their* movements, nor *they* the creatures of *his* will, so that motives must be presented to induce them to labour for him at such times and places as *he* shall prescribe, instead of for themselves at such time and places as *they* shall please. This is the true complexion and relative position of capital and labour in this and all other free countries, with which, therefore, we must deal. . . . Hundreds of coffee and sugar plantations have been given up; the labourers disengaged were free to do as they pleased. And what did they please? *Not to go to the remaining plantations, but to turn to on their own account.* Hence the anomaly of a cry of "no labour in the country," at the moment of tens of thousands of men being thrown loose from all engagements."

It really appears to me that these are nearly the iden-

tical sentiments which I myself enunciated in the letter which has called forth Mr. Valpy's "correction." I say—"There can be no question that the tone of mind which ensued when the shackles of bondage were struck off did for a long time, and does now to a very considerable extent, render extremely difficult the employment of labourers in the colonies. . . . As a last resource, and to keep their heads above water from day to day, they disposed of their lands, bit by bit, to those very negroes, &c. . . . What negro could be induced to labour for another who had an acre or two of land to cultivate for himself. . . . He was free—aye, as free as the white man, his former lord. He would not labour as a serf—why should he?"

Mr. Valpy is not pleased that "the proposed new colony of Honduras should draw a further supply of labour from its prostrate sister colonies." Surely I have a right to go to the cheapest market—wheresoever that market may be—for labour as well as for any other commodity. If I offer to labourers in Jamaica higher wages than they are at present getting, it is a legitimate transaction, and Mr. Valpy is not justified in accusing me of "*enticing* the negro population from the island." I do not go surreptitiously and covertly to work—I proceed openly and publicly. I do not attempt to seduce labourers from their employers, but I find them disengaged, and I offer them good wages and cash payments. Would Mr. Valpy scruple to go to Ireland for reapers, if he could get them cheaper there than in England? He may depend upon it that the "finest pisantry of the worrorld" will not leave their pigs and potatoe fields if they can get employment and good wages in their own country. He says, "if any scheme be set on foot for that purpose he warns the parties of a complete failure." And why? Because "the Jamaica people have spent hundreds of thousands of pounds in immigration, and hundreds of thousands of labourers are still required." This sounds very like a *non sequitur*. It is our stage-coach companion and the fleas over again. Granted that they have spent hundreds of thousands of pounds in immigration, where do we see the fruits of that expenditure? An "echo answers, where?" But what does Mr. Anderson say upon this subject, in the letter which Mr. Valpy quotes?

"This scheme (immigration) has involved the island in a large amount of debt, without apparently having made the desired impression on the labour market; and been accompanied by an *appalling* amount of suffering, destitution, and mortality."

How can the fact of their having spent so much money render the scheme a complete failure? On the contrary, it is more likely to make it successful. If they have before spent so many thousands of pounds, and "involved the island in a large amount of debt" by so doing, they have the less to spend now. If Mr. Valpy had said the scheme would be a failure, because there was a great demand for labour in Jamaica, and if higher wages were offered than what were now paid, the proprietors in that island, having plenty of capital, would bid higher still—I should certainly have agreed with him.

But why should Mr. Valpy call Jamaica and other islands "prostrate colonies"? They are not prostrate. Many of the proprietors may be ruined, the production of sugar and rum may have ceased to be as profitable as heretofore, capital may have fled, energy may be extinct, the people may neglect their substantial interests to engage in political squabbles and angry discussions, but the countries themselves are very far from being prostrate.

Mr. Valpy says, "Mr. Temple, together with many others, advocates immigration of unskilled labour, involving a mixture of races, and the importation of every variety of heathenism." Of course I do. I advocate the introduction of as much heathenism as possible. I prefer it. Rest assured that the heathen will not Paganise the Christian, but the Christian will convert the heathen. "For the unbelieving husband shall be sanctified by the

wife, and the unbelieving wife shall be sanctified by the husband." I say, by all means let us have every variety of heathens. Let us instruct their minds; let us teach them the great and glorious truths of Christianity; let us initiate them in the true liberty of the cross; and then, with the Bible in their hands and Christian love in their hearts, let us send them to their own country to preach to their benighted brethren. That "large class" of whom Mr. Valpy speaks, "who advocate another view, and seek to arrest the influx of such an accumulation of ignorance and vice," are selfish and short-sighted. They are like a timid physician, who hesitates to feel his patient's pulse, lest he should catch his disorder. I have no sympathy with them. But I accord with those who boldly encounter the foe—and like the courageous Sydenham, who, when the plague was raging in London, placed himself in the midst of the encampment to challenge and do battle with the pestilence. Respecting the religion of the Indian immigrants, Mr. Hill, stipendiary justice of peace, and acting-agent-general of immigration, thus writes: "There is little doubt that something might be done to place these denominations of immigrants in a better condition, both socially and with respect to Christian progression, than is at present within their reach. Few persons are so inquiring as to acquaint themselves with the fact that *there are any but inveterate heathens or irreclaimable Mahomedans among the Indian immigrants.*"

Mr. Valpy says, that, in speaking of the Coolies, who were brought to Jamaica, I have made "misstatements" and "unfounded assertions." This is a serious charge, and I think Mr. Valpy would have done well if he had abstained from giving expression to such unmitigated terms. Now I humbly conceive that I made no statements, nor assertions, the correctness of which I am not in a position to prove. I said that the Coolies had not been over *well* treated in Jamaica, and that they were thrown on their own resources in a strange country. To that statement I adhere. With respect to those unfortunate creatures much blame is attributable on all sides. In the first place, there can be no doubt that too little care was bestowed in the selection of them, especially those who were brought from Madras. Instead of hiring only able-bodied and industrious men, who had been used to agricultural operations, many idle persons were engaged who were quite unaccustomed to that species of labour, and who were beggars and vagabonds in their own country. In the second place, in addition to the wages, &c., of the Coolies, the proprietors, now reduced to great pecuniary distress, were required to pay a tax for every labourer they employed, and if they hired any without the consent of the Governor they were subjected to a penalty. This regulation unquestionably prevented many Coolies from being employed. Several proprietors and managers who did employ the Coolies upon their estates were not kind and conciliatory to them, refused to humour their oriental prejudices, were careless about their personal habits, and neglected to provide for them any religions or moral instruction. In consequence of the treatment they received, great numbers deserted from the plantations on which they were engaged, and in company with those who, partly on account of the tax, partly on account of prejudices against the eastern strangers, and partly on account of pecuniary inability, were not employed at all, wandered about the country in a state of the most abject misery and destitution. But this was not all. The poor wretches, almost in a state of nudity, suffering from chigoes, covered with sores, a mass of filth and abomination, without food to eat, without a shelter under which to lie, were not classed with the native poor, and for a considerable time were denied parish relief. It was only after the urgent solicitations of Sir C. Grey that a very scanty assistance was afforded to a few. Sir C. Grey, in a despatch, dated 6th March, 1848, addressed to Earl Grey, speaking of the Coolies, says:—

"The repeal of the law which subjected all persons to a tax who employed them for however short a time, and to a penalty, if it was done without the leave of the Governor, will gradually give employment to many, *who must otherwise have gone without it*; for the distressed condition of the sugar planters has made several of them comparatively indifferent whether, during the spring, they obtain labourers or not; and in divers instances those who have had gangs of Madras Coolies have positively refused, on the expiration of the contract, to renew it, unless upon inadmissible conditions, such as not being obliged to find medical assistance, &c. There has been a great deal of vagrancy and begging, much misery, and, I am afraid, some cases even of death from destitution and its consequences. It is not easy, when the Legislature is not in session, and in the present dissatisfied state of the colony, to devise the means of giving any extensive relief; but I have made it generally known, and it has not excited any opposition, that the laws of vagrancy are applicable to the Coolies, and that destitution entitles them to parochial relief like the other poor; and I urge upon the Agent-General and his subordinate agents the necessity of paying constant attention to the claims and condition of these people."

There can be little doubt that, if there had been no impediments to the employment of the Coolies, and if those who were employed had been kindly and judiciously treated, the Indian immigrants would, upon the whole, have been valuable labourers.

This was proved by the fact, that those who *were* well treated did *not* desert from the plantations on which they were engaged, but gave the greatest satisfaction in every respect to their employers. Mr. Hill writes, "Though unfitted for the heavier species of field work, they have been found useful auxiliaries to the more robust negro in every department of cultivation which requires *care, diligence, and perseverance*. In weeding and planting, in hoeing and thrashing, *they are more to be depended on for faithful work than the African*, and they really fill most desirably a middle place in the field economy of plantation. The testimony of so valuable a witness as Mr. Roberts to the orderly and economic habits of the Coolies, in their leisure and retirement after labour, is no unimportant addition to the several approving communications laid before the House of Assembly lately in session." In answer to a circular issued by Mr. Hill, inquiring into the causes of vagrancy and desertion, Mr. George Ashby, of Amity Hall, says, "I am happy to say there are no Coolies deserted from this estate." Mr. Thomas Heath, of Danks, says, "They all appear to be happy, and attend to their work regularly, and most of them have a provision ground of their own. Indeed, it is my firm belief that the estate could not be carried on without them."

Mr. Rose, of Pennant's Estate, writes—"The coolies on this estate (*both Calcutta and Madras*) have been very steady, and not more than five or six days' labour of one coolie has been lost by absence from the estate since their arrival on it."

Mr. A. J. Lindo, a proprietor, of Friendship Estate, Port Maria, St. Mary, writes—"I have had 15 Madras coolies located on this estate since May last. There has been no desertion or vagrancy of any of them; their conduct is generally good, and with the exception of slight intermittent fever, they have been healthy. I have to regret that I have not twice the number, *as I am of opinion that were proper care taken of the people, desertion and vagrancy would not be of common occurrence, and that they would be a useful acquisition to estates.*"

Mr. William Duncan, of Parnassus Estate, Clarendon, writes—"I beg to state that occasionally the coolies give some trouble, *which I overcome by kind treatment*, and determination in enforcing the due performance of their contract; none have left the estate to wander about the country. They are now looking well and working regularly."

The above testimonials of the value of the coolies as labourers, when properly treated, are a sample of a very great number to a like effect which were sent in reply to the circular; but there were also some of an opposite character. Take the following as a specimen:—

Petersfield Estate, Westmoreland, Dec. 8, 1847.

SIR,—In reply to your circular of the 4th instant, addressed to the overseer of this estate, I have the honour to inform you that I have never given in my name for Coolies, that it is only within this last month *that I had the misfortune to come in contact with such disgusting, filthy creatures*. I should suppose the cause of vagrancy to arise here from their long confirmed habits of vagrancy in their own country; the cause of desertion, their loving vagrancy better than work. It appears to me that all interested in the preservation of common decency should deem their desertion from the island a great blessing." Such letters as the above require no observation. The following remarks are made by Mr. Emery, Stipendiary magistrate, and sub-agent of immigration:—"In Hanover, however, it is true, the spirit of desertion and vagrancy has all along shown itself to exist to a most powerful and disgusting degree. I attribute this sad state of things to the culpable apathy and indifference of the authorities of Lucea, who, instead of exercising that wholesome authority with which they were vested for the public advantage, actually held, and hold, out encouragement to the wandering gangs, by directing the police force not on any account to interfere with the people's liberty, and permitting them to accumulate in hordes, and sleep in the under part of the Court-house nightly, a horrid spectacle of filth and nakedness, a bright example of unbridled vagabondage and misery for the more depraved of our own peasantry to emulate them in. In conjunction with the inactivity of the magistracy, and the absence of all interference on the part of the police force, (which reduced as it is to a mere handful of men for each parish, is of little or no use at all), with the wandering Coolies, whose desertion and vagrancy has called forth this inquiry by the Hon. House of Assembly, with a view to apply (as I trust) some prompt remedy to so great an evil, I should imperfectly perform my task if I left unaccused many managers of properties, of very great blame, by inattention, carelessness, and in some instances utter recklessness, of the health, cleanliness, and comfort of the poor people placed under their care and charge, the more especially when in sickness, because they so unequivocally and expressly show their great confidence in, and full expectation of receiving at such hands that treatment as exacted from employers by the terms of their contract, and irrespective of which they conceive the common feelings of humanity should prompt them to exercise. I say emphatically that a heavy load of moral guilt attaches to many managers on this score, *for dissatisfaction has not unnaturally been engendered by such treatment, the continuance of which unimproved in any shape, has led to the result now manifesting throughout the island.*"

Mr. W. A. Bell, of St. Dorothy, sub-agent of immigration, thus writes: "I conceive the reasons to be various and combined which have led many of the Indian immigrants to desert from time to time the properties on which they have been employed. The difference of management amongst the overseers must be a cause of desertion or non-desertion; some are most conciliatory, kind, firm, sensible, and really appear to wish the people, as immigrants, to do well for themselves and the property, and seem to succeed invariably. Others again give a nurse for the sick, and other necessities, food, &c., and comply with the words of the agreement; but, from an aversion to any immigrants excepting negroes (the attorneys having placed these Indians under them), or from idleness, pay no further attention to them, neither encourage nor conciliate. If they work, pay them, if not, leave them alone. These overseers do not succeed,

neither do the immigrants. It has been the custom to consider that when a planter becomes an overseer, he should know his business; it must, therefore, have been distasteful to many to have labourers given to them whose language, habits, and peculiar management they were totally unacquainted with; and as they were made answerable for the amount of labour, with reference to the pay bill of the week, it may account for some difference in the numbers absent at times from the property's field."

I think I have now brought forward sufficient evidence to prove that I made no "unfounded assertion," and that I was not guilty of a "mis-statement" when I said that the Indian Coolies in Jamaica had not been *over well* treated, and that they had been left to their own resources. But Mr. Valpy also denies the correctness of my statements with respect to the Chinese labourers. I say that they are very intelligent, and on that account have been preferred in Cuba to the negro. Mr. Valpy says, "The vagrant Chinese are utterly helpless, having defied the efforts of the Agent-General of Emigration, and of their own leading countrymen, to settle them in a plantation for the cultivation of rice or ground nuts." It is quite possible that the Chinese—and for the same reasons, perhaps—did not succeed in Jamaica any better than the Coolies. But they were more fortunate in British Guiana and Trinidad. Sir Harry Barkly, in a despatch, dated the 26th February, 1853, addressed to the Duke of Newcastle, thus gives his valuable testimony as to the efficiency of Chinese labourers.

"With respect to the remaining point, their efficiency in labour, it might almost suffice to say that the six set to break stones within the jail, accomplish a far greater amount of work in the allotted hours than has ever previously been got out of either negroes, Portuguese, or Coolies; but I can also bear testimony to the general approbation expressed of them as labourers in sugar cultivation by all the planters who have yet had to do with them, corroborated by the material fact of the large earnings to which they had entitled themselves in addition to their keep."

Lord Harris, in a despatch dated 22nd March, 1853, addressed to the Duke of Newcastle, says:—"The planters are highly pleased with the Chinamen, and universally consider them far superior to any labourers they have ever received, and it will be most unfortunate if any discontent should arise from circumstances over which we, in this colony, had no control."

I have got an abundance of evidence yet to bring forward, were it necessary, to prove the almost universal good opinion entertained of the Chinese as labourers. But I think I have said quite enough to satisfy you that I have not been guilty of "misstatements" and "unfounded assertions."

I am, &c.,

R. TEMPLE.

25, Bernard-street, Russell-square.

Home Correspondence.

RESISTING POWER OF IRON.

SIR,—In the *Journal of the Society of Arts* of the 19th ult., Mr. Bridges Adams, in his valuable letter on the Bessemer iron, proposed a series of experiments to be made by Government, but none of them have any reference to the power of an iron navigable vessel to resist shot. This question is, however, of vast importance, as well to the mercantile as to the military marine, for, should a merchantman be assailed by the enemy, she would immediately strike if not able to do so. The series of experiments to ascertain this should embrace, 1st, the thickness of plate of iron which would best resist penetration of shot; 2nd, the danger to a ship's crew that

would ensue from splinters; 3rd, the obliquity with which the shot strikes; 4th the means of stopping shot holes; and these must all be ascertained when afloat as well as on a fixed butt on shore, since the recoil of a vessel on water, however slight, may be sufficient to prevent injury.

The experiments hitherto made in this country have only been on a fixed butt. The naval officers who gave their evidence to the Committee of Finance, in the year 1848, were of opinion that iron vessels could resist shot, but Mr. Fairbairn decidedly told me that the experiments made at Woolwich were adverse to this statement.

I am, Sir, yours truly,

M. S. BENTHAM.

28, Wilton-place, October 6th.

NEGATIVE ARTESIAN WELLS.

SIR,—Mr. G. Bailey Denton has, in No. 196, p. 688, of your *Journal*, endeavoured to ridicule the term "negative," which I use in my treatise on "Negative Artesian Wells, or Absorbing Bored Wells," in Nos. 192—195 of the same *Journal*. Mr. Denton is probably not aware that the late celebrated M. Arago was the first who applied the word "negative" in connexion with Artesian Wells, in the *Annuaire* for the year 1835, p. 243 (Paris, 1834), where he says:—

"Les trous par lesquels se jettent dans les entrailles de la terre, des nappes d'eau qui, faute de ce moyen d'écoulement, séjourneraient à la surface, pourraient en quelque sorte être appelés *des fontaines artésiennes négatives*, &c.," and from that time the term has been adopted, and is well understood on the Continent.

That Negative Artesian Wells should only be executed where there is no natural outfall, or any great difficulty in establishing one, is a matter of course, and this must be apparent to any one reading only the first page of my treatise, where I say:—"Which (water), for want of a fall in the ground could not be drained in the common way."

The practice to which Mr. Denton alludes, of establishing such sumps (sumphs) or swallow holes, which are not able to carry off the drainage water entirely and under all circumstances, *appears* not only, but *is*, open to objection, and I myself reject such a procedure as faulty and wanting all claim to the title of a skilful engineering operation. Those who read my treatise attentively must be convinced of this.

I am, &c.,

A. E. BRUCKMANN,

Consulting Engineer and Geologist.

26, Upper North-street, Brighton, October 13, 1856.

Proceedings of Institutions.

ALTON.—The 19th annual report of the Mechanics' Institution congratulates the members upon its increasing efficiency, there being 90 annual and 148 quarterly subscribers. Several lectures have been delivered during the past year, which have been generally well attended, and during the ensuing winter they are likely to be more numerous than usual. The committee are anticipating the services of the following gentlemen, but their subjects are not at present fixed, viz.—the Hon. and Rev. S. Best, the Rev. F. M. Cunningham, the Rev. G. D. Snow, Dr. Burnett, L. Leslie, Esq., and Mr. Stewart. Besides these, Dr. Curtis intends to give five or six lectures on physiology; Mr. A. C. Crowley, two on the Manners, Customs, &c., of the Ancient Egyptians; and Mr. F. Crowley, one on Heat; all of which will be copiously illustrated. Three other lectures are expected from the Rev. C. Boutell, and the committee hope to add one from Mr. Grossmith, and also a musical entertainment. The Museum was opened on the first day of the present year, and it has far exceeded the expectations of those

who have visited it. The curator's report states that nearly 60 individuals have made contributions to it. The greater number of these consist of natural history specimens, together with a few coins, antiquities, weapons, and other implements. The committee take the opportunity of impressing on the friends of the Institution, the importance of making the local collection as complete as possible, and hope to be further aided by the presentation or loan of fresh objects likely to be interesting to visitors, or possessed of educational value. The subject of classes is receiving much attention, and the committee hope to obtain some voluntary assistance from those competent to teach. Some valuable aid has already been kindly offered. Means are being taken to establish an elementary class, also others for music, French, and drawing. The natural history class has been held weekly since its commencement, on January 25th, and has generally been well attended. There has been given a course of seventeen lessons or familiar lectures on the mammalia, seven on mineralogy, one on birds' eggs, and eleven on botany. The Committee express their approval of the system of examination instituted by the Society of Arts, and the Hants and Wilts Adult Education Society. They believe it will have the effect of stimulating the formation of classes, which are becoming every day a feature of greater importance in the objects of Mechanics' Institutions, and that the certificate so obtained will prove of great practical value to successful students. The only member of the Alton Institution who has competed, W. H. Blake, jun., has just obtained a first class Prize and Certificate from the Hants and Wilts Society; and the Committee earnestly hope that his example will be followed by others at the next examination.

BEDFORD.—On the 7th inst. the usual half-yearly meeting of the members of the Literary and Scientific Institute was held in the Reading-room of the Society. Mr. Blower occupied the chair. The business transacted was of the usual character. Four gentlemen were elected to act on the committee in the place of those retiring by rotation. The retiring four were Messrs. Usher, Sergeant, Ballard, and Nicholls. The first three were re-elected, and Mr. Stowell in the place of Mr. Nicholls. A vote of thanks to Mr. Blower, for his conduct in the chair, was carried by acclamation.—On the previous evening Dr. Barker devoted an hour or two to an exhibition with microscopes, to which the members of the Institute had been invited. On the table were two instruments belonging to Dr. Barker, in addition to those recently purchased for the Institution from the Society of Arts. The large microscope which Dr. Barker had kindly brought with him was the object of much admiration; but the beautiful instrument which is now the property of the Society gave great satisfaction, and bade fair to be not only a source of amusement, but a stimulus to scientific pursuits. A large number of objects had been furnished by Dr. Barker, and the greater part occasioned equal gratification and wonder to all who were present.

CORNWALL.—The Royal Cornwall Polytechnic Society opened its 24th Annual Exhibition on Wednesday, the 17th September. The Exhibition was, on the whole, deemed by the supporters and friends of the Society, to be of a satisfactory character, and especially in the most important portion of its operations—the Mechanical Department, the committee having this year devoted a larger proportion of the funds at their disposal, in prizes for mechanical inventions. Considerable attention was excited by an Induction Coil Machine, invented by Mr. J. N. Header, of Plymouth, which is said to be more powerful than that constructed by M. Ruhmkorff, of Paris, although the length of wire employed is very much less. Mr. Header stated that he had been enabled, by means of this apparatus, to develop an entirely new law of electrical action, on which subject a communication was made to the Society. In the Fine Arts department there was,

generally, a good and interesting exhibition, and the Natural History collection, though small, contained some curious specimens.

LONDON.—ROYAL POLYTECHNIC INSTITUTION.—Nearly 200 persons have already formed the evening classes at this Institution. The classes in arithmetic, algebra, chemistry, and French, are very numerous attended. The regular course of instruction will commence next Monday, at seven o'clock. From a preliminary examination of the classes, which took place by the Professors during the last week, it is expected that at least 60 per cent. will attend the Society of Arts Examination. Some disappointment has occurred in reference to the delay in the supply of textbooks, and nearly all the students have been obliged to purchase them at the ordinary published price.

LONDON AND SOUTH-WESTERN LITERARY AND SCIENTIFIC INSTITUTION.—A lecture, on the Genius and Career of Shakspeare was delivered at this Institution, on Thursday evening, the 9th instant, by Mr. Alfred Bunn, who afforded the greatest satisfaction to an unusually large and attentive audience.

NAILSWORTH.—The Report of the Literary and Mechanics' Institute gives an account of its continued prosperity, the number of members being about 150. Several additions have been made during the past year to the library, which now contains 671 volumes. Eleven lectures were delivered during the session, upon subjects of varied interest, and the attendance on the whole was good. The committee call attention to the important advantages which have lately been afforded to all the members of this and similar Institutions by the Society of Arts, in affording access to periodical examinations in various mental attainments, a proficiency in which secures, in some cases, appointments to offices of emolument and trust, and in others, entitles the successful candidates to certificates of merit, which become of great value to the holder.

To Correspondents.

ERRATUM.—In the last number, page 745, col. 1, No. 165, for "*The principles of Great Circle Sailing with Physical Geography*," read "*The practice of Great Circle Sailing with the principles of Physical Geography*;" and insert No. 165A, For a simple Telescope of moderate price, to determine distances to 1,000 yards.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, October 10th, 1856.]

Dated 21st August, 1856.

1954. William Heap, Demus Sharp, and George Knowles, Bradford—Improvements in the construction of furnaces for economizing fuel and preventing smoke.

Dated 25th August, 1856.

1982. George Warriner, Withernsea, Yorkshire—Improvements in compounds for preserving, deodorizing, and fertilizing.

Dated 6th September, 1856.

2074. Henry Dyer, Plaistow, Essex, and George Dyer, Gracechurch-street—Improvements in freeing textile fabrics, cotton waste, and fibrous matters from oily and other impurities.

Dated 23rd September, 1856.

2225. John George Taylor, Glasgow—Improvements in fastenings, connectors, and couplings, and in the application thereof.
2226. David Ogilvy Boyd, 78, Welbeck-street—Improvements in constructing and arranging flues for the passage of air or smoke.
2227. Francis Wrigley, Long Island Iron Works, Carlisle—An improved friction coupling for the transmission of motive power.
2228. Robert Winterbottom, Junr., Lancashire—Improvements in the mode or method of making or producing dry barn or yeast.
2229. Richard Husband, Manchester—Certain improvements in the manufacture of silk hats.
2230. Alfred Vincent Newton, 66, Chancery-lane—Improvements in gimlets, augers, and other tools which operate by a rotary motion. (A communication.)

2231. William Johnson, 47, Lincoln's-inn-fields—Improvements in machinery for doubling and twisting fibrous materials. (A communication.)

Dated 24th September, 1856.

2232. Arthur George Baylis and John Green, Redditch, Worcester-shire—An improvement or improvements in the manufacture of needles.
2233. Andrew Barrie, Edinburgh.—A new or improved instrument or apparatus for registering the time at which workmen arrive at and leave their place of work, and for other such like purposes.
2235. James Cottrill, Studley, Warwick—Improvements in machinery to supersede hand labour in the operation of filing.
2236. Alfred Vincent Newton, 66, Chancery-lane—Improvements in carding engines. (A communication.)
2237. Peter William Barlow, Great George-street, Westminster—Improvements in the permanent way of railways.
2239. William Beatson, Rotherham—Improvements in puddling iron.
2240. Charles Vion, 133, High Holborn—Improvements in metallic moulds, and in the manner of using them for casting metals. (A communication.)

2241. Victor Frederic Antoine Prost, Paris—Improvements in weaving and in the machinery or apparatus employed therein.

Dated 25th September, 1856.

2242. Robert Brown, Glasgow—Improvements in taps or valves.
2243. Thomas Holmes and Thomas Aspinall, Pendleton—Improvements for preventing or diminishing the production of smoke in fireplaces and furnaces, and for effecting its combustion.
2244. Joseph William Wilson, Banbury—Improvements in machinery or apparatus for manufacturing parts of brooms and brushes.
2245. Carlo Sayno, Novara, Piedmont—Improvements in bearings, beds, or sockets for axles, pivots, or other rotary parts of machinery.
2247. Etienne Sabatier, Paris—Improvements in the permanent way of railways.
2248. Henry William Parnell, 13, Bryanston-square—The construction of ships and boats.
2249. Arthur Albright, George-street, Edgbaston—Improvements in the manufacture of Lucifer matches, and of boxes suitable for containing the same.
2250. Robert Frost, Chester—Improvements in the manufacture of flour.
2251. John James Russell, Wednesbury, and Joseph Bennett Howell, Sheffield—Improvements in the manufacture of cast-steel tubes.
2252. Matthew Andrew Muir and William James Walker, Glasgow—Improvements in machinery or apparatus for sizing or dressing yarns or threads.
2253. Samuel Calle, Brixham, Devon—Improved composition and compositions for coating or covering surfaces, particularly the bottoms of ships and vessels.

Dated 26th September, 1856.

2254. Claude Langlois, Bath—Improvements in photography.
2255. John Forster Meakin, 84, Baker-street, Portman-square—An improved fire escape.
2256. Marius Pellen, 68, Rue d'Anjou St. Honoré, Paris—Rendering impermeable by gas, caoutchouc, gold beaters' skin, paper, gauze, and similar materials used for things adapted to receive an ascending force, such as balloons, aerostatic machines, toys, &c., by the application of a peculiar varnish.
2257. Charles Renshaw, Dukinfield, Cheshire—Improvements in squeezing rollers, applicable to machinery or apparatus for pressing or partially drying yarns and woven fabrics.
2258. William Horsfall, Manchester—An improvement or improvements in cards for carding fibrous substances.
2259. George Gower Woodward, Kidderminster—Improvements in the manufacture of carpets.
2260. Frederick Ransome, Ipswich—Improvements in the manufacture of artificial fuel.

Dated 27th September, 1856.

2262. David Thom and George Aldcroft Phillips, Manchester—An improvement in "soap frames."
2264. John Boyd, Ashbocking, Suffolk—Improvements in letter-press printing machines.
2266. William Smith, Skinner-street, Snow-hill, and Nathaniel Fortescue Taylo, Stratford, Essex—Improvements in apparatus for measuring gas and other fluids, and in regulating the flow of the same.

2268. Captain John Montagu Hayes, R.N., 6, Portland-terrace, Southsea—Improvements in percussion cap holders.

2270. John Rothwell, Park-hill, Bolton—A certain composition and preparation to promote the ignition and combustion of coke, coal, and other combustible substances in stoves, furnaces, and grates.

Dated 29th September, 1856.

2272. Luke Duncan Jackson, Underwood, Selstone, Nottingham, and Henry Myers, 52, Rathbone-place—An apparatus for the better working of breaks in stopping railway trains.
2274. Charles John Carr, Belper—Improvements in operating hammers and stamps.
2278. David Thom and George Aldcroft Phillips, Manchester—Certain improvements in apparatus used in the manufacture of soap.
2280. John Lord, Rochdale—Certain improvements in the process of separating or recovering animal wool or silk from cotton and woollen or from cotton and silk or other mixed fabrics, whereby the animal wool or silk is rendered capable of being again employed, which said improvements are also applicable to wool in its unmanufactured state.

2282. George Tomlinson Bousfield, Sussex-place, Loughborough-road, Brixton—An improvement in the manufacture of artificial stone. (A communication.)

Dated 30th September, 1856.

2284. Samuel Ivers, Halseham Moor, near Bolton-le-Moors—Certain improvements in looms for weaving.
2286. Robert Craib Ross, Glasgow—Improvements in paddle wheels for propelling apparatus for ships or vessels.
2288. William Gostwyck Gard, Calstock, Cornwall—Improvements in bits for boring and sinking.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2281. Henry Jenkins, Birmingham—Improvements in the manufacture of buckles and other dress-fasteners.—29th September, 1856.

WEEKLY LIST OF PATENTS SEALED.

Sealed October 10th, 1856.

872. Robert Davis.
874. Jarne Mash.
879. Robert Baird Lindsay.
880. Edwin Heywood.
884. Robert Richardson.
888. Joseph Barrans.
892. Leonard Kaberry and Aaron Horsefield.
893. Alfred Vincent Newton.
898. Thomas Jeffries.
946. François Jean Bouwens.
952. Joseph Auguste Marie Touet Chambor.
1107. John Henry Johnson.
1546. George Edward Dering.
1559. William Henry Hubbard.
1586. Robert Shaw.
1814. William Coltmann.
1880. Chapman March.

Sealed October 14th, 1856.

882. Patrick Robertson.
883. John Symonds and Thomas Mara Fell.
895. Hugo Frederick Forbes.
909. William Edward Newton.
911. Wm. Armitage and Henry Lea.
915. Henry Young Darracott Scott.
1009. Thomas Restell.
1033. Rd. Archibald Brooman.
1048. Henry Atwood Thompson.
1057. William Bulmer and Isaac Sharp.
1091. Léon Louis Jardin and Joseph Blamond.
1198. David Shaw.
1653. Pierre Beauplant Rasant.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

- October 6th.*
2295. William Henry Johnson.
2313. William Edward Newton.
- October 7th.*
2334. William Henry Muntz.
2348. Charles Scott Jackson.
2350. Charles Scott Jackson.
2469. Edward Austin.
2603. William Rodger.
- October 8th.*
2310. Henry Richardson Plimpton and James Leonard Plimpton.
2366. Andrew McLean and William Fraser Rae.
- October 9th.*
2408. John Wright Child and Robert Wilson.
2355. John Elce.
2375. Charles Coates.
- October 10th.*
2329. James Worrall, junr.
2335. James Webster.
2336. John Francis Porter.
2339. John Morison and Daniel Hurn.
- October 11th.*
2421. William Russell.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
3883	Oct. 6.	Railway Rug or Carriage Wrapper.....	H. J. and D. Nicoll.....	Regent-street.
3884	" 7.	Paragon Bonnet Support	Rd. Leake and Thomas Dodd.	230, Oxford-street.
3885	" 8.	Gas Apparatus for Heating Purposes ..	Henry Craigie	Edinburgh.
3886	" 10.	Medal Fastener	T. B. Bailey	Coventry.
3887	" 10.	{ A Fastener for securing Buttons to Boots, Vests, &c.....	Thomas Greaves	Birmingham.
3888	" 10.	{ Apparatus to facilitate the Burning of Smoke in Furnaces.....	Henry Rawton	Leicester.
3889	" 11.	Improved Railway Guard's Belt Chro- nometer Case and Message Box	Charles Hippolyte Proteri.....	Duke-street, Lincoln's-inn-fields.
3890	" 14.	Machine for Paring, Slicing, and Coring	Richard Trimmings and Sons.	Birmingham.